CLAIMS

1. An optical security element (1) having a substrate layer (14), wherein a first microstructure (17) for producing a first optically perceptible effect is shaped region-wise into the substrate layer (14) in a surface region (2; 5) of the substrate layer,

characterised in that

the surface region (2; 5) is divided into microscopically fine pattern regions (21 to 40; 51 to 90) and a background region (20; 50) and the first microstructure (17) is shaped in the pattern regions (21 to 39; 51 to 90) but not in the background region, that the microscopically fine pattern regions (21 to 39; 51 to 90) in the surface region (2; 5) are arranged in the form of a moiré pattern into which a concealed item of information which can be evaluated by means of an associated verification element is encoded as a security feature, and that the microscopically fine pattern regions (21 to 39; 51 to 90) are further substructured in accordance with a substructuring function which describes a microscopic substructuring, serving as a further security feature, of the moiré pattern.

2. An optical security element according to claim 1 characterised in that the first microstructure (17) is a first diffraction grating.

3. An optical security element according to claim 1 characterised in that the first microstructure is a diffraction structure for producing a first hologram.

4. An optical security element according to claim 1 characterised in that the first microstructure is a first matt structure.

5. An optical security element according to one of claims 1 to 4 characterised in that a reflecting surface (18) is arranged in the background region (20; 50).

6. An optical security element according to one of claims 1 to 4 characterised in that a second microstructure is shaped in the background region (20; 50), that microstructure being formed by a second diffraction grating which is different from the first diffraction grating.

7. An optical security element according to one of claims 1 to 4 characterised in that a second microstructure is shaped in the background region (20; 50), said second microstructure being formed by a diffraction structure for producing a second hologram.

8. An optical security element according to one of claims 1 to 4 characterised in that a second microstructure is shaped in the background region (20; 50), said second microstructure being formed by a second matt structure which is different from the first matt structure.

9. An optical security element according to one of the preceding claims characterised in that the moiré pattern comprises a line grating with a plurality of lines at a line spacing in the range of 40 to 200 μm, wherein the line grating is phase-displaced in region-wise manner to produce the concealed information.

10. An optical security element according to claim 9 characterised in that the line grating has regions in which the lines of the line grating are curved.

11. An optical security element according to one of claims 1 to 8 characterised in that the moiré pattern comprises two line gratings which are rotated relative to each other through at least 45 degrees.

12. An optical security element according to one of claims 1 to 9 characterised in that the moiré pattern comprises a two-dimensional grating.

13. An optical security element according to one of the preceding claims characterised in that the average surface coverage of the moiré pattern in relation to the resolution capacity of the human eye is constant.

14. An optical security element according to one of the preceding claims characterised in that the average surface coverage of the substructuring described by the substructuring function in relation to the resolution capacity of the human eye is constant.

15. An optical security element according to one of claims 1 to 13 characterised in that the average surface coverage of the moiré pattern is varied by partially different substructuring (141, 151, 161, 171, 181).

16. An optical security element according to one of the preceding claims characterised in that the substructuring function describes a continuous substructuring pattern (41).

17. An optical security element according to one of claims 1 to 13 characterised in that the substructuring function describes a non-continuous substructuring pattern (42, 44, 45, 46, 47, 48).

18. An optical security element according to claim 16 characterised in that the substructuring function describes a substructuring pattern (42, 44, 45) made up of a plurality of similar individual elements.

19. An optical security element according to claim 18 characterised in that the spacings of the individual elements (44, 45) and/or their orientation (46, 47, 48) is varied for encoding of a further item of information but the average surface coverage of the substructuring pattern, which can be resolved by the human eye, remains constant.

20. An optical security element according to one of claims 1 to 15 characterised in that the substructuring function describes a microtext or nanotext which is preferably of a letter height in the range of 20 to 100 μm.

21. An optical security element according to one of claims 1 to 15 characterised in that a two-dimensional grating is superimposed on the substructuring function.

22. An optical security element according to one of claims 1 to 15 characterised in that the pattern regions (91, 92) are substructured with an asymmetrical surface profile and that the centroids of the pattern regions (91, 92) are phase-displaced in region-wise manner to produce the concealed information.